CLAIMS

What is claimed is:

1. An article comprising:

a heat spreader including a die side and a heat-sink side; and

a container barrier disposed on the heat spreader die side, wherein the container barrier and the heat spreader form a recess upon the die side.

2. The article of claim 1, further including:

a first channel through the heat spreader to communicate from the die side to the heat-sink side; and

optionally a first plug disposed in the first channel.

3. The article of claim 1, further including:

a first channel through the heat spreader to communicate from the die side to the heat-sink side;

optionally a first plug disposed in the channel;

a second channel through the heat spreader to communicate from the die side to the heat-sink side; and

optionally a second plug disposed in the second channel.

4. The article of claim 1, further including:

a first channel through the container barrier; and

a first plug disposed in the first channel, wherein the plug is gas-permeable and liquid-impermeable.

5. The article of claim 1, further including:

a first channel through the container barrier;

a first plug disposed in the first channel, wherein the first plug is gas-permeable and liquid-impermeable;

a second channel through the container barrier to communicate from the die side to the heat-sink side; and

a second plug disposed in the second channel, wherein the second plug is gas-permeable and liquid-impermeable.

6. The article of claim 1, wherein the container barrier is selected from a solder, a leaded solder, a lead-free solder, a reactive solder, an indium material, a tin material, a silver material, a tin-silver material, a tin-silver-indium material, and combinations thereof.

7. The article of claim 1, wherein the container barrier is selected from a metal; a polymer-solder hybrid; a polymer matrix and a metal preform; and a polymer matrix, a metal preform, and a middle heat transfer structure disposed therebetween.

8. The article of claim 1, further including:

a liquid heat-transfer medium disposed in the recess.

9. The article of claim 1, further including:

a liquid heat-transfer medium disposed in the recess, wherein the liquid heat-transfer medium is selected from an organic composition, a metal, and combinations thereof.

10. A package comprising:

a heat spreader including a die side and a heat-sink side;

a container barrier disposed on the heat spreader die side, wherein the container barrier and the heat spreader forms a recess upon the die side; and

a liquid heat-transfer medium disposed in the recess.

11. The package of claim 10, wherein the heat spreader is selected from a heat slug, a heat pipe, and an integrated heat spreader.

12. The package of claim 10, wherein the die side of the heat spreader includes a convoluted interface with the liquid heat-transfer medium.

13. The package of claim 10, further including:

a first channel through the heat spreader to communicate from the die side to the heat-sink side; and optionally

a first plug disposed in the first channel.

14. The package of claim 10, further including:

a first channel through the heat spreader to communicate from the die side to the heat-sink side;

optionally a first plug disposed in the first channel;

a second channel through the heat spreader to communicate from the die side to the heat-sink side;

optionally a second plug disposed in the second channel.

15. The package of claim 10, further including:

a first channel through the container barrier;

optionally a first plug disposed in the first channel.

16. The package of claim 10, further including:

a first channel through the container barrier;

optionally a first plug disposed in the first channel;

a second channel through the container barrier; and

optionally a second plug disposed in the second channel.

17. The package of claim 10, further including:

a die in contact with the liquid heat transfer medium.

18. The package of claim 10, further including:
a die in contact with the liquid heat transfer medium; and
a mounting substrate coupled to the die.

19. A process comprising:
forming a container barrier upon a heat sink substrate to achieve a recess, the recess including:
a recess wall including the container barrier; and
a recess base including the heat sink.

20. The process of claim 19, wherein forming the container barrier upon the heat sink is cold forming, selected from rolling, pressing, stamping, and combinations thereof.

21. The process of claim 19, wherein forming the container barrier upon the heat sink includes assembling a polymer-solder hybrid container barrier.

22. The process of claim 19, further including:
disposing a liquid heat transfer medium in the recess.

23. A process comprising:
forming a container barrier upon a die to achieve a recess, the die including an active surface and a backside surface, and the recess including:
a recess wall including the container barrier; and
a recess base including the die backside surface.

24. The process of claim 23, wherein forming the container barrier upon a die includes assembling a polymer-solder hybrid container barrier.

25. The process of claim 23, further including:
assembling the container barrier upon a heat sink.

26. The process of claim 23, further including:
disposing a liquid heat transfer medium in the recess.

27. A computing system comprising:
a heat spreader including a die side and a heat-sink side;
a container barrier disposed on the heat spreader die side, wherein the container barrier and the heat spreader form a recess upon the die side;
a die in contact with the container barrier;
a liquid heat-transfer medium disposed in the recess; and
at least one of an input device and an output device coupled to the die.

28. The computing system according to claim 27, wherein the computing system is disposed in one of a computer, a wireless communicator, a hand-held device, an automobile, a locomotive, an aircraft, a watercraft, and a spacecraft.

29. The computing system according to claim 27, wherein the die is selected from a data storage device, a digital signal processor, a micro-controller, an application specific integrated circuit, and a microprocessor.